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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/746,018	12/26/2000	Jung-Yu Lee	Q62414	2272

7590

07/01/2003

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EXAMINER

NGUYEN, DILINH P

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 07/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/746,018

Applicant(s)

LEE ET AL.

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-9, 11, 12 and 27-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 12 and 27-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Claim Objections

Claim 27 is objected to because of the following informalities:

In line 7 of claim 27, the phrase: "...wherein said head spreading means..." should be changed to wherein said heat-spreading means.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 7-9 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barrow (U.S. Pat. 6146921).

Barrow discloses a semiconductor device (fig. 1, column 2, lines 13 et seq.) comprising:

a substrate 14;

a die 12 located and supported on the substrate and it is obviously having an adhesive between them;

a plurality of signal transferring means which electrically connects the die to the substrate;

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a molding compound 22 which seals and protect the die and the plurality of signal transferring means, wherein the molding compound has geometrically a concave 24 at the top surface of the center part;

a heat spreading device 26 which is attached atop the molding compound to conduct heat from the die to ambient air, wherein the heat spreading device has a downward bump 28 aligned to the concave; and

a plurality of conductive 18 means attached below the substrate and the substrate of Barrow comprises conductive traces (column 2, lines 26-32), wherein the conductive means electrically connect a plurality of conductive traces on the substrate to external circuits.

- Regarding claim 8, Barrow discloses the plurality of conductive means includes a plurality of solder balls 18.
- Regarding claim 9, Barrow discloses the plurality of signal transferring means can be a plurality of bonding wires 16.
- Regarding claim 11, Barrow discloses the heat spreading device 26 can be made of metal (column 2, lines 49-50).
- Regarding claim 12, Barrow discloses the die has a thermally conductive epoxy 30, which conduct heat from the die through the molding compound to the heat spreading device (column 2, lines 51-61).

3. Claims 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barrow (U.S. Pat. 6146921).

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Barrow discloses semiconductor device (figs. 1-2, column 2, lines 15 et seq.) comprising:

molding 22 means, with a concave 24 located at the central part of the top surface, for sealing and protecting a die 12, which is obviously adhered on a substrate by an adhesive layer and electrically connected to the substrate by a plurality of signal transferring means 16 (column 2, lines 26-32); and

heat spreading 26 means for conducting heat from the die to ambient air by attaching atop the molding means, wherein the heat spreading means has a downward bump 28 aligned to the concave.

- Regarding claim 28, Barrow discloses a plurality of conductive 18 means attached below the substrate to electrically connect a plurality of conductive traces on the substrate to external circuit (column 2, lines 26-32).
- Regarding claim 29, Barrow discloses the plurality of conductive 18 means includes a plurality of solder balls 18.
- Regarding claim 30, Barrow discloses the plurality of signal transferring means can be a plurality of bonding wires 16.
- Regarding claim 31, Barrow discloses the heat spreading 26 means can be made of metal (column 2, lines 49-50).
- Regarding claim 32, Barrow discloses the die has a thermally conductive epoxy 30, which conducts heat from the die through the molding means to the heat spreading device (column 2, lines 51-61).

Response to Arguments

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the thickness of the molding compound on the center portion is thinner than on the periphery of the chip. The molding compound between the chip and the heat slug prevents the chip from rubbing against the bump of the heat slug caused by the different thermal expansion coefficient) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant's arguments filed 5/6/03 have been fully considered but they are not persuasive.

The applicant argues that Barrow discloses the step of attaching the thermal element after the mold process can insure that the element is in direct thermal contact with the integrated circuit. Barrow discloses a package structure eliminating the formation of plastic between the thermal element and the integrated circuit. That which is disclosed by Barrow teaches away from the claimed invention.

The Examiner disagrees.

The claimed invention is directed to the semiconductor device not directed to the method or process of making the semiconductor device.

The claimed invention does not disclose the formation of plastic between the thermal element and the integrated circuit. The claimed invention discloses the die has

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the thermally conductive glue, which conducts heat from the die through the molding means to the heat spreading device.

Barrow discloses the die 12 has a thermally conductive epoxy 30, which conducts heat from the die 12 through the molding means 22 to the heat spreading device 26 (figs. 1-2, column 2, lines 56-61).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (703) 305-6983. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers

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for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN
June 14, 2003

Wael Fahy
SPE 2814